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International meeting on chemical safety and security, Tarnów, Poland, 8-9 November 2012

Do provisions to advance chemical facility safety also advance chemical facility security? - An analysis of possible synergies

Frank Huess Hedlund, COWI, DTU

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Background

- The Directive on European Critical Infrastructures (ECI Directive) addresses facility **security** but does not cover the chemical sector
- Chemical facility **safety** at EU level is addressed by way of the Seveso-II Directive
- Suggestion that perhaps 80% of the existing safety measures under Seveso-II would also be instrumental in terms of raising security
- Some Member States went beyond the minimal requirements of the Seveso II Directive and established additional security-relevant elements or launched special national initiatives
- Result: The European Commission launched a study on the applicability of existing chemical industry safety provisions to enhancing security of chemical facilities. Covers the situation in 18 EU Member States.

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This presentation

- Preliminary analytical findings regarding the extent to which existing provisions that have been put into existence to advance safety objectives due to synergy effects could be expected advance security objectives as well
- define security, safety
- examine differences, synergies

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Safety and security

- The key distinction between safety and security relates to malicious intent
- Preventive safety analysis aims at identifying vulnerabilities in the design and control philosophy, in particular situations in which the failure of a single component could lead to an excursion of the permissible design parameters
  - *Safety Risk = Likelihood of accident × Consequence*
- In contrast, security is the degree of protection against danger, damage, loss, and crime. For a high-risk chemical facility many security measures will relate to physical protection, safeguarding an asset from unauthorized access and acts of malevolence
  - *Security Risk = Threat × Vulnerability × Impact*

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Security framework – selected elements

Facility	Facilities with high-risk chemicals present	Facilities with high-risk chemicals that are targets in themselves
Concern	Theft of HRC material,	Attack with destructive force, intentional release of HRC onsite
Formalism, documentation	Security plan (prepared)	Security management system (SMS) Security Report, submitted to authorities
Perimeter	Fences and gates, access control	Fences and gates, access control Vehicle barriers SVA
Building	Secured, under lock	Target hardening SVA
Intrusion detection	Intrusion detection system and alarm	Intrusion detection system and alarm SVA

(SVA = Security Vulnerability Assessment)

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Security framework – selected elements

Facility	Facilities with high-risk chemicals present (theft)	Facilities with high-risk chemicals that are targets in themselves (attack)
Intrusion response	(not required)	SVA
Security presence	(not required)	SVA
Personnel vetting	Basic (checklist)	SVA (Background checks employees) (check of contractors)
Inventory control and response	Procedures that identify, investigate, and resolve shortages Procedures for reporting shortages to law enforcement agencies Procedures for preservation of forensic evidence	SVA

(SVA = Security Vulnerability Assessment)

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Safety framework (excerpt) – which security elements covered ?

Safety provision	Interpretation of typical scope	Assessment of security elements (potentially) covered
Safety policy	Example : To prevent accidents and provide adequate control of risks; to provide adequate training; to engage and consult with employees, etc,	Concerns prevention of accidental (unintentional) events. Security elements not covered
Safety Strategy and Control Framework	Typical control elements: management of change (MOC) not to introduce errors into the design; a permit to work (PtW) system to coordinate tasks and manage staff; a mechanical integrity program (including corrosion monitoring); etc	Concerns prevention of accidental (unintentional) events. Security elements not covered
Hazard Identification and Risk Assessment	The result of a hazard identification is a list of potential concerns	A hazard identification step is the starting point for a list of possible targets - security overlap
	Risk assessment employ frequency analysis, assuming random failures of components	Approach not applicable for security

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Safety framework (excerpt) – which security elements covered ?

Safety provision	Interpretation of typical scope	Assessment of security elements (potentially) covered
Organisation management, roles and responsibilities	Safe organisation means having necessary resources, qualified staff, and sound division of roles and responsibilities, e.g. separating the responsibility for the inspection and maintenance unit	Security elements not covered
Inspections, audits, reviews	Typical inspections deal with workplace tidiness, mechanical integrity, corrosion monitoring	Security elements not covered
	Typical audits relate to adherence to permit to work procedures, if preventive systematic risk reviews have been carried out, if checklists used, procedures before entry into confined space adhered to	Security elements not covered
	Typical technical reviews relate to overpressure protection, liquid hammer, adequate capacity of blow down facilities, passive fire protection	Security elements not covered

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Safety framework (excerpt) – which security elements covered ?

Safety provision	Interpretation of typical scope	Assessment of security elements (potentially) covered
Land-use Planning	Good land use planning keeps communities away from hazardous installations	Very clear overlap with security
Emergency preparedness, response and planning	Emergency preparedness aims to mitigate the effects of a release, regardless if it is intentional or accidental	Overlap with security (depends on scenario)
Communication with and information to the Public	General knowledge, enables citizens to take adequate protective measures in case of a toxic release	Very clear overlap with security, beneficial both for accidental and intentional releases of toxic chemicals.

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Baseline Protection Concept

- Germany has developed a **security concept** and methodology known as the *Basisschutzkonzept* (Baseline Protection Concept) which aims to provide **guidelines** for infrastructure operators to develop protection measures.
- Recommendations focus both on the methodology for adopting protection measures and on minimum protection requirements.
- A sample checklist is provided to assist private sector operators in completing or upgrading their infrastructure protection plans in practice

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Security framework (baseline protection concept) – any safety elements covered ?

Category	Number of checklist items	Synergy	Negative synergy	Unclear
1. Protection of facilities and installations	69	7	1	1
2. Personnel	9	0	0	0
3. Organisation	30	10	1	3
4. Risk management	9	6	0	3
5. Emergency planning and contingency planning	14	13	0	0
Total	131	36	2	7
Percent	100%	27%	2%	5%

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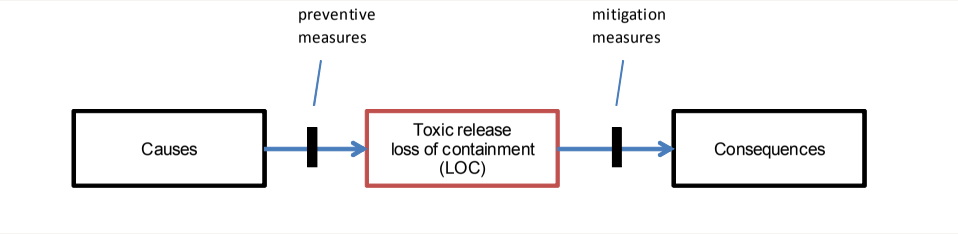
Basic barrier diagram



› A barrier diagram in its most basic form, linking causes and consequences of a toxic release from a high risk chemical facility and marking the precautions related to prevention and mitigation

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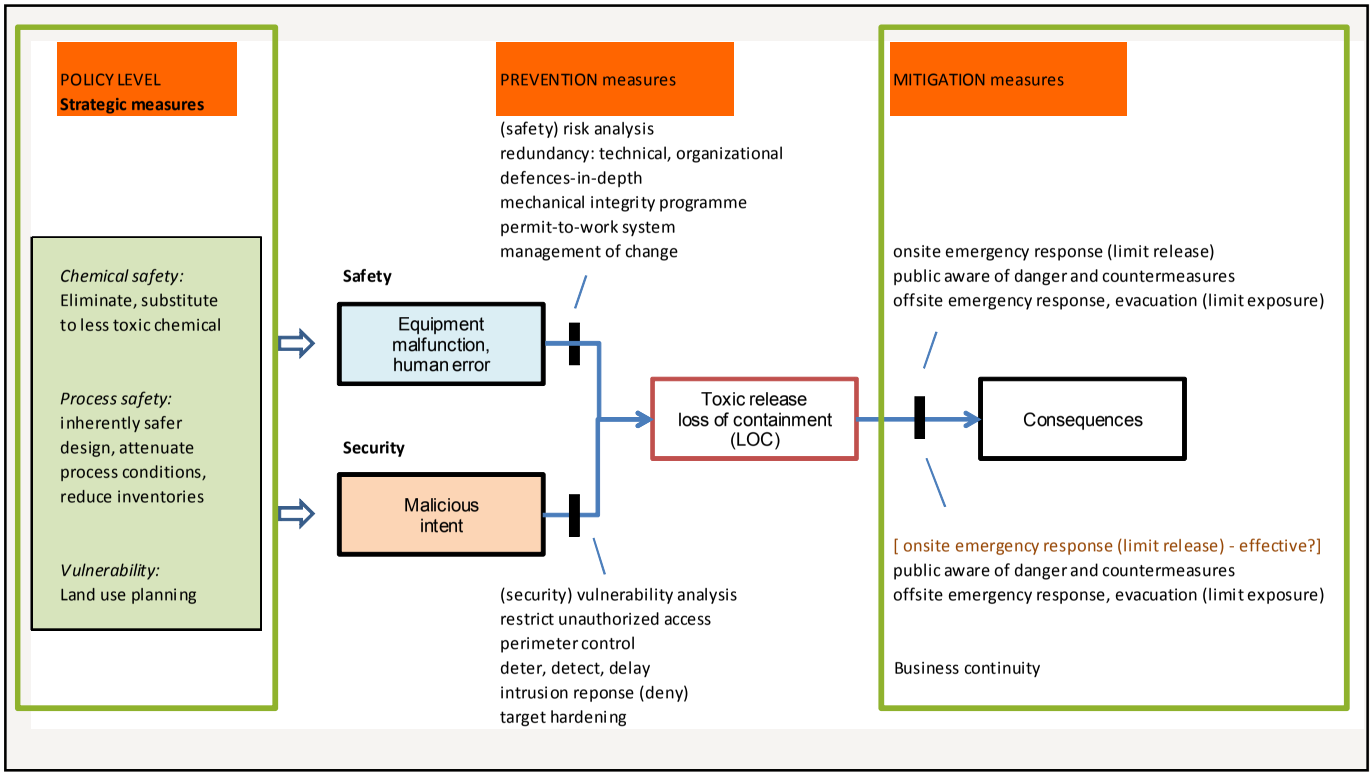
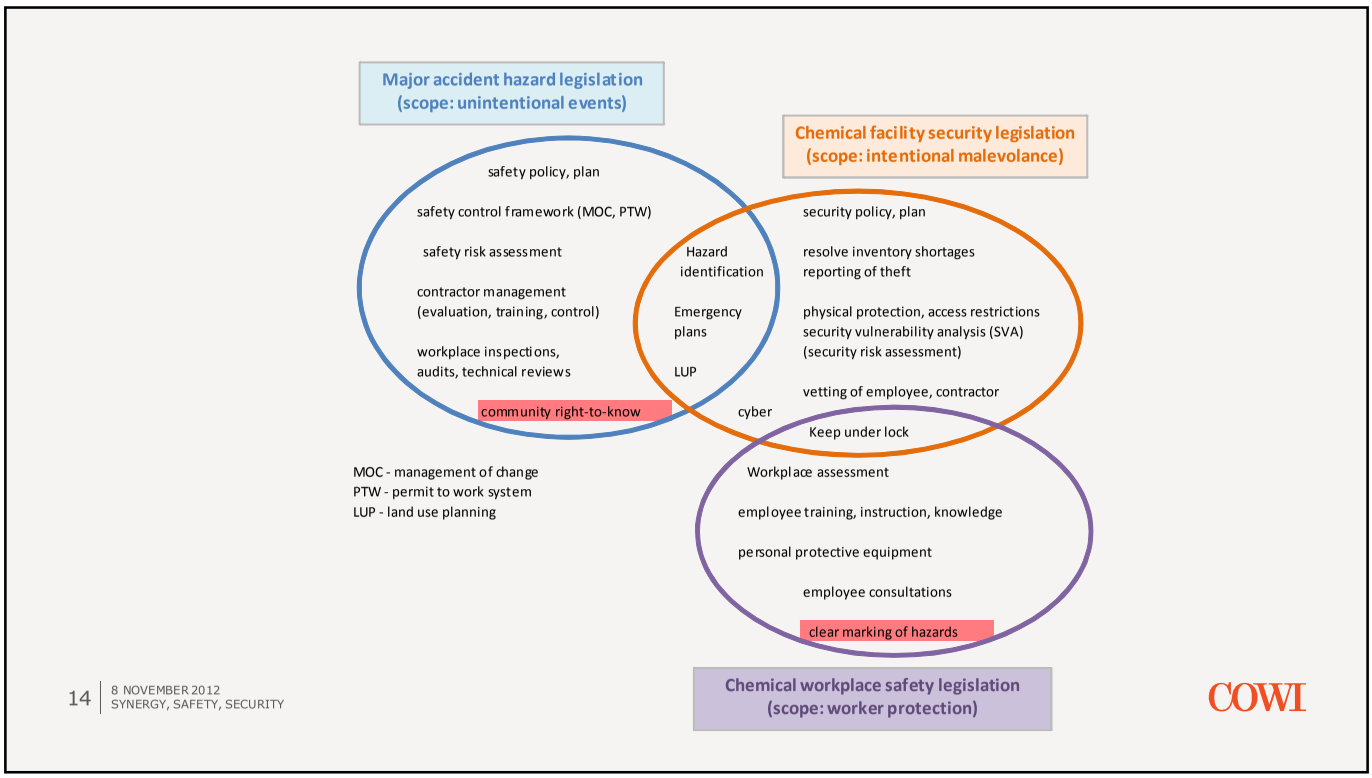

POLICY LEVEL
Strategic measures
Chemical safety:
Eliminate, substitute to less toxic chemical
Process safety:
inherently safer design, attenuate process conditions, reduce inventories
Vulnerability:
Land use planning
PREVENTION measures
(safety) risk analysis
redundancy: technical, organizational
defences-in-depth
mechanical integrity programme
permit-to-work system
management of change
Safety
Equipment malfunction, human error
Security
Malicious intent
Toxic release loss of containment (LOC)
MITIGATION measures
onsite emergency response (limit release)
public aware of danger and countermeasures
offsite emergency response, evacuation (limit exposure)
Consequences
[onsite emergency response (limit release) - effective?]
public aware of danger and countermeasures
offsite emergency response, evacuation (limit exposure)
Business continuity
(security) vulnerability analysis
restrict unauthorized access
perimeter control
deter, detect, delay
intrusion reponse (deny)
target hardening


Major accident hazard legislation (scope: unintentional events)
Chemical facility security legislation (scope: intentional malevolance)
safety policy, plan
safety control framework (MOC, PTW)
safety risk assessment
contractor management (evaluation, training, control)
workplace inspections, audits, technical reviews
community right-to-know
Hazard identification
Emergency plans
LUP
cyber
security policy, plan
resolve inventory shortages
reporting of theft
physical protection, access restrictions
security vulnerability analysis (SVA)
(security risk assessment)
vetting of employee, contractor
Keep under lock
MOC - management of change
PTW - permit to work system
LUP - land use planning
Workplace assessment
employee training, instruction, knowledge
personal protective equipment
employee consultations
clear marking of hazards
Chemical workplace safety legislation (scope: worker protection)
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8 NOVEMBER 2012
SYNERGY, SAFETY, SECURITY
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Thank you for your attention !

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